UNITED STATES PATENT AND TRADEMARK OFFICE

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10/758,797	01/15/2004	Lev Borisovich Nachmanson	3382-66933	6509

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EXAMINER
SILVER, DAVID

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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>08 August 2005</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-20</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>15 January 2004</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>7/6/04 8/8/05</u>.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-20 are pending in Instant Application.

Priority

2. Priority is not claimed.

Information Disclosure Statement

3. The information disclosure statement(s) (IDS) submitted on 08/08/2005 and 07/06/2004 is/are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement(s) is/are being considered if signed and initialed by the Examiner.

Requirement for Information / Duty to Disclose

4. The documents enumerated below were written by at least one of the Instant Application's named Inventors. The documents were not submitted to the Office for consideration. Based solely on the titles, it may not be unreasonable to consider the documents as being material to the patentability of the Instant Application. Therefore, the Applicants are respectfully requested to make the following documents of record:

4.1 Colin Campbell, Wolfgang Grieskamp, Lev Nachmanson, Wolfram Schulte, Nikolai Tillmann, and Margus Veanes: Model-based Testing of Object-Oriented Reactive Systems with Spec Explorer Technical Report MSR-TR-2005-59, Microsoft Research, May 2005, to appear in ``Formal Methods and Testing", LNCS.

4.2 Lev Nachmanson, Margus Veanes, Wolfram Schulte, Nikolai Tillmann, and Wolfgang Grieskamp: Optimal strategies for testing nondeterministic systems in ISSTA'04, pages 55-64 , July 2004.

4.3 Mike Barnett, Wolfgang Grieskamp, Lev Nachmanson, Wolfram Schulte, Nikolai Tillmann, and Margus Veanes: Model-Based Testing with AsmL.NET in 1st European Conference on Model-Driven Software Engineering, December 2003.

4.4 Mike Barnett, Wolfgang Grieskamp, Lev Nachmanson, Wolfram Schulte, Nikolai Tillmann, and Margus Veanes: Towards a Tool Environment for Model-Based Testing with AsmL in 3rd International Workshop on Formal Approaches to Testing of Software (FATES 2003) , October 2003.

4.5 Mike Barnett, Wolfgang Grieskamp, Wolfram Schulte, Nikolai Tillmann, and Margus Veanes:

Validating Use Cases with the AsmL Test Tool in QSIC 2003: Proceedings of the Third International

Conference on Quality Software, November 2003.

4.6 Wolfgang Grieskamp, Yuri Gurevich, Wolfram Schulte, and Margus Veanes: Testing with Abstract

State Machines in Roberto Moreno-Diaz and Alexis Quesada-Arencibia, Formal Methods and Tools for

Computer Science - EUROCAST'01 - Extended Abstracts, February 2001.

4.7 Wolfgang Grieskamp, Markus Lepper, Wolfram Schulte, and Nikolai Tillmann: Testable Use Cases in

the Abstract State Machine Language in Proceedings of Asia-Pacific Conference on Quality Software

(APAQS'01), December 2001.

5.   A 37 CFR 1.105 Requirement for Information is not currently being made.

Drawings

6.   Figure 14 should be designated as --Prior Art-- because only that which is old is illustrated (computer,

monitor, and I/O devices). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR

1.121(d) are required in reply to the Office action to avoid abandonment of the application. The

replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR

1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by

the examiner, the applicant will be notified and informed of any required corrective action in the next

Office action. The objection to the drawings will not be held in abeyance.

Claim Interpretation

7.   Limitations drawn to allowing, enabling or making optional a function's performance does not further

limit a claim. As such, any prior art not explicitly prohibiting the performance of the function

inherently anticipates the limitation.

8.   As per claims having "for" statements or an equivalent thereof, the language recited following the

"for" is interpreted as reciting functional features and intended use.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claims 1-6 and 15-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

9.1 In this instance, absent an explicit and deliberate definition in the specification that the product includes an appropriate medium or hardware elements, the claims are directed to software, *per se*. Note exemplary claim 15 which recites only software instructions. Additionally, software, *per se*, is not considered concrete (MPEP 2106).

MPEP 2106 recites, in part:
"...USPTO personnel shall review the claim to determine it produces a useful, tangible, and concrete result. In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the final result achieved by the claimed invention is "useful, tangible, and concrete." (emphasis added)

9.2 The method claims do not produce a useful, tangible, and concrete final result. The steps of the method claims do not produce a useful, tangible, and concrete result. They merely recite a software algorithm, per se, which, for example, does not display, store, or otherwise provide a useful tangible output. Note exemplary claim 1 which only recites software steps and does not produce a useful tangible and concrete **final result**. See MPEP 2106 [R-5] (partially recited above).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:
The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the **enablement requirement**. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As per claim 1, the limitation "executing the program under test conditions that cause the program to

execute through states that correspond to the created strategies" is not enabled for, at least, the

following reasons: the strategies merely increase the probability of executing/reaching the discrete

sequences not reached. Therefore, the strategies do not guarantee that the states will be executed and

therefore the claim limitation is not enabled because the claims fail to enable one skilled in the art to

which it pertains to make and use the invention.

As per claim 5, the claim recites, in part: "wherein the executing program is instrumented with

executable code that verifies upon execution that a program state conforms to a state of the graph".

"[U]pon execution" means that the program has finished executing. Specifically, after a program has

finished executing (upon execution), a program is no longer running and therefore cannot execute

further instructions to that verify operations. How can a program, after it had been executed and is no

longer running, verify that its own program state conforms to a state of the graph?

11. Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being **indefinite** for failing to

    particularly point out and distinctly claim the subject matter which applicant regards as the invention.

There is insufficient antecedent basis in the following claim(s) for the limitation(s) enumerated below:

Claim 1, lacks antecedent basis for "the program under test conditions".

Claim 13, lacks antecedent basis for "the created strategies".

12. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary

    to its ordinary meaning, the written description must clearly redefine the claim term and set forth the

    uncommon definition so as to put one reasonably skilled in the art on notice that the applicant

    intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350,

    1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "instrumented" in claim 5 is indefinite

    because the specification does not clearly redefine the term.

13. Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for **omitting**

    essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The

    omitted steps are: establishing conditions that cause the program to execute through states.

14. The above-cited rejections are merely exemplary. The Applicant(s) are respectfully requested to

correct all similar errors.

15. Claims not specifically mentioned are rejected by virtue of their dependency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al **(US 5,659,555)**.

Lee discloses: 1. A computerized method of creating test coverage for non-deterministic programs comprising:

receiving a graph of edges and states representing a program under test **(col: 5 line: 12-17; col: 6 line: 8-25)**;

creating a continuous cycle of edges through the graph that reaches each edge in the graph at least once **(col: 12 line: 4-14)**;

splitting the continuous cycle into discrete sequences that end at edges reaching non-deterministic states in the graph **(Fig 5 and its description)**;

executing the program and verifying that the program conforms to the behavior represented by discrete sequences **(col: 8 line: 37-51)**;

determining untested program behavior as discrete sequences not reached by the program **(col: 4 line: 10-25; col: 8 line: 3-10; Fig 5 and descriptions; col: 11 line: 24-34)**;

creating strategies through the graph that have a higher probability of reaching discrete sequences not reached by the program **(col: 4 line: 11-23; col: 8 line: 37-51)**; and

executing the program under test conditions that cause the program to execute through states that correspond to the created strategies **(col: 4 line: 11-23; col: 8 line: 37-51)**.

Lee discloses: 2. The method of claim 1 wherein the received graph is a set of states and a set of edges, and edges are represented as state source-target pairs **(col: 11 line: 24-34 "state pair"; col: 2 line: 28-36)**.

Lee discloses: 3. The method of claim 1 wherein the continuous cycle of edges is created from the graph input using a Chinese Postman tour algorithm **(col: 2 line: 56 to col: 3 line: 9)**.

Lee discloses: 4. The method of claim 1 wherein the graph states are received as a set of deterministic vertices and a set of non-deterministic vertices **(col: 2 line: 28-36)**.

Lee discloses: 5. The method of claim 1 wherein the executing program is instrumented with executable code that verifies upon execution that a program state conforms to a state of the graph **(col: 2 line: 28-36; col: 8 line: 37-51)**.

Lee discloses: 6. The method of claim 1 wherein created strategies are inputs that represent edges between states of the graph, and test conditions cause the program to enter untested program behavior **(col: 7 line: 30-62; col: 7 line: 60-65; col: 12 line: 4-14)**.

Lee discloses: 7. A computer system comprising:

memory and a central processing unit executing **(inherent)**, a compiler for compiling an executable specification into an abstract state machine **(Fig 3 item 305 and Fig. description)**, a graphing program for creating a continuous cycle touching all edges of the abstract state machine, and for splitting the continuous cycle into discrete sequences that end at non-deterministic states **(col: 5 line: 12-17; col: 6 line: 8-25; col: 5 line: 8-15; col: 6 line: 26-35)**;

a strategy calculation program **(Fig 5 and description)** for creating strategies more likely to reach the untouched discrete sequences;

a coverage program for executing a program and verifying that the program executes states corresponding to those modeled by discrete sequences of the abstract state machine and for determining untouched discrete sequences and for executing the program according to the created strategies and verifying whether the program executes states corresponding to the untouched discrete sequences **(col: 4 line: 11-23; col: 8 line: 37-51)**.

Lee discloses: 8. The system of claim 7 wherein a continuous cycle is determined according to a Chinese Postman algorithm **(col: 2 line: 56 to col: 3 line: 9)**.

Lee discloses: 9. The system of claim 7 wherein discrete sequences comprise beginning states reachable

from edges exiting non-deterministic states **(Fig 5 and its description; col: 12 line: 4-14)**.

Lee discloses: 10. The system of claim 7 wherein an untouched discrete sequence is a state selectable

from a program code executing at a remote computer **(Fig 2 item 7 (and Figure's descriptions)**

Application which is coupled to Presentation to Session to Transport to Network from Host A

to Host B and is therefore remote).

Lee discloses: 11. The system of claim 7 wherein the abstract state machine comprises a graph of states

and edges **(col: 6 line: 8-25)**.

Lee discloses: 12. The system of claim 11 wherein the strategy calculation program receives the graph

and an edge probability function as input **(Fig 5 and its descriptions)**.

Lee discloses: 13. The system of claim 7 wherein untouched discrete sequences represent less than 10%

of the discrete sequences and all untouched discrete sequences are touched when the program is

executed according to the created strategies **(col: 8 line: 52 to col: 9 line: 7; a program without**

untouched discrete sequences anticipates this limitation).

Lee discloses: 14. The system of claim 7 wherein not all untouched discrete sequences are verified when

the program is executed according to the created strategies **(col: 4 line: 16)**.

As per claim 15, note the rejection of claims 1 and 7 above. The Instant Claim recites substantially same

limitations as the above-rejected claims and therefore rejected under same prior-art teachings.

Lee discloses: 16. The computer-readable medium of claim 15 wherein the modeled program behavior is

modeled as an abstract state machine **(Fig 3A and descriptions)**.

Lee discloses: 17. The computer-readable medium of claim 15 wherein the split sequences are

represented as a sequence of edge transitions of an abstract state machine **(col: 2 line: 37-46; Fig 4,**

5 and their descriptions; col: 10 line: 59-60; col: 9 line: 7-14).

Lee discloses: 18. The computer-readable medium of claim 15 wherein the non-deterministic behavior

comprises communications with a remote computer **(col: 5 line: 18-25: "An FSM sends a message**

to other FSMs by means of an "output operation" designated by the "!" symbol. Where, for

example, there are two FSMs, machine #1 and machine #2, an output operation in machine

#1 is denoted by machine2!msg").

Lee discloses: 19. The computer-readable medium of claim 15 wherein determined strategies are determined based on a comparison of edges exiting a deterministic state representing program behavior, and a selected edge has a highest probability of reaching a state representing the identified program behavior **(Fig 5 and its description; col: 12 line: 4-14; col: 6 line: 50-55)**.

Lee discloses: 20. The computer-readable medium of claim 15 wherein the instructions for verifying program behavior cause the program to execute code that verifies that the program is in an expected model state **(col: 2 line: 28-36; col: 8 line: 37-51)**.

Conclusion

17. All claims are rejected.

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Silver whose telephone number is (571) 272-8634. The examiner can normally be reached on Monday thru Friday, 10am to 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Silver
Patent Examiner

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SUPERVISORY PATENT EXAMINE